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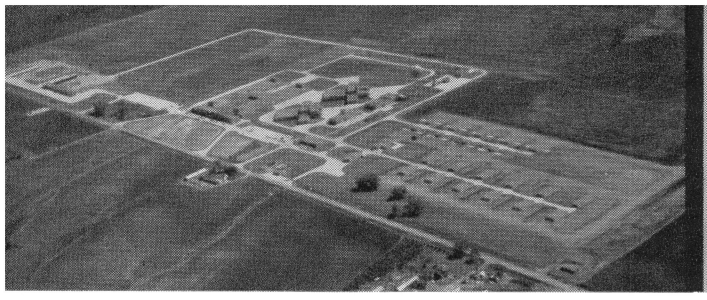


New, near Iowa State . . The National Animal Disease Laboratory

by J. Clayton Herman
Assistant Editor

A SMALL CITY of research buildings just northeast of Ames marks the 318-acre site of the new National Animal Disease Laboratory. A "landmark" orange-and-white-checkered water tower overlooks the site (see cover).

Completed and opened this year, the USDA installation is the world's most modern veterinary research facility. The new facility consists of 33 fire-resistant buildings for conducting basic and applied studies of the principal animal diseases prevalent in the United States.

It is one of three major research centers operated by USDA's Agricultural Research Service for the protection and improvement of animal health. The others are the Plum Island (New York) Animal Disease Laboratory (for the study of foreign diseases not now established in animals in the United States) and the Parasitological Research Laboratoratories in Beltsville, Md., (for the study of parasites that infect livestock).

Dr. William A. Hagan is director of the new Animal Disease Laboratory at Ames. Before assuming his present post, he was a faculty member of the veterinary college of Cornell University for more than 40 years, including 27 years as dean of that college.

The 16.5-million-dollar installation will enable scientists to find new ways to conquer the diseases that rob the nation's livestock and poultry producers of an estimated 2.7 billion dollars each year. The scientists' goal is a national livestock population as nearly free as possible from disease.

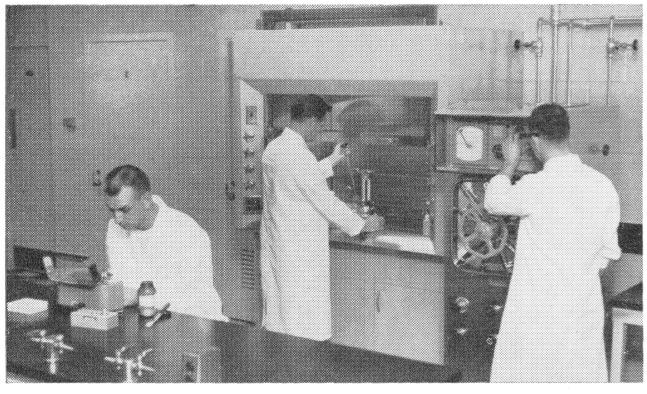
The site, only a few miles from the Iowa State University campus, includes a 35-acre compound area where research laboratories and service buildings are located and a 60-acre quarantine area in which disease-free animals are held until needed for research. Half of the 318 acres is pasture on which cattle, hogs and sheep are raised.

Three research buildings are the heart of the installation. The main laboratory contains 32 separate units used for studies involving small animals. Two isolation buildings are equipped for holding larger farm animals used in experimental work. All other buildings support or reinforce the research or provide necessary services.

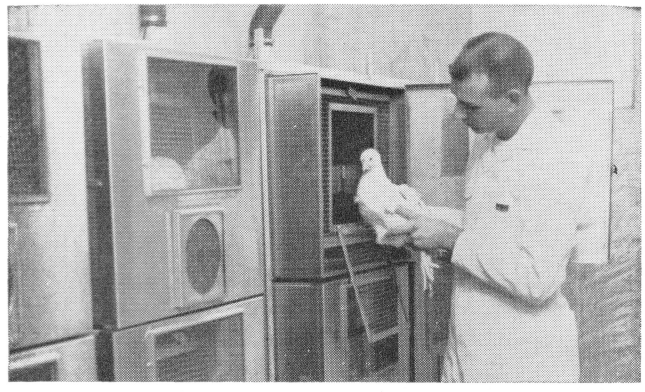
Safety Features . . .

The laboratory's built-in safety features permit study of about 25 different animal diseases at the same time. The safety features also protect both the research workers and the community against accidental spread of diseases.

Extensive precautions are designed to protect research workers from diseases to which man is susceptible, to prevent escape of disease agents from the laboratory to the surrounding community, to



This is a typical research "module" of the world's newest veterinary research facility—USDA's new National Animal Disease Laboratory at Ames, Iowa. Jim Hurd, medical biological technician, is weighing a specimen with the scales on the table. Behind him Bacteriologist Joe Songer is blending cultures under the fume hood, where toxic agents—such as sulfuric acid—may be handled safely. At the right Jim Rounds, another medical biological technician, is adjusting the autoclave, an airtight chamber used for sterilizing various materials.



Jim Hurd examines a chicken taken from one of the cages in the large animal laboratory. Climate-controlled isolation rooms allow scientists to duplicate any normal combination of temperature and humidity in the United States. Different temperature and humidity may be maintained even in adjoining cages. You can't see it in the picture, but green designates the door through which large animals enter; red designates the door through which scientists and animal caretakers enter.

prevent introduction of diseases from the community into the research areas and the disease-free animal colony and to prevent cross-contamination between different areas within the laboratory or between research areas and the disease-free colony.

All animals, equipment, supplies, feed and other materials moving into research buildings must pass through double-doored air locks. Air locks are electrically controlled so that the outer door can't be opened until the inner door to the laboratory is sealed, and vice versa.

Animals used for research are from selected stock from outside sources or from the laboratory's disease-free colonies, some of which have been maintained for more than 20 years in Maryland. The colonies brought from Maryland include cattle, swine, poultry, rabbits and guinea pigs.

A person entering a research building must leave street clothing and personal belongings—even jewelry—in an outer locker room and pass through a shower stall to an inner locker room where he dons appropriate laboratory clothing. Laboratory clothing worn in the various areas of the research buildings are of different colors. An employee or visitor would be spotted immediately if he attempted to move from one area to another without changing clothes.

Even the air is decontaminated. Air flowing out of the research buildings is decontaminated in a system of filters. Within the research buildings, no air is allowed to move from one contaminated area to another. A system of different pressures insures that air moves in an outside-to-inside direction whenever persons, animals or materials enter the buildings.

All air entering the research buildings is filtered and then conditioned as may be required. All air exhausted is filtered through deep-bed filters located in each unit and then through welded exhaust ducts extending through the roof. Filters and ducts can be decontaminated when necessary, without disturbing operations in any other room or unit.

All liquid wastes are sterilized by heat before being discharged as sewage from the research buildings. All solid wastes, including animal carcasses, are destroyed by incineration within the research buildings.

An air-conditioning system provides temperature- and humidity-regulated air for the principal buildings. Air brought into the administration building and main laboratory is washed and filtered to remove dirt, heated or cooled, and then circulated through the intricate air duct system. A delicate balance is maintained, so that air flows only from clean to contaminated areas. It is exhausted—never recirculated—after it has been drawn through bacterial filters to remove disease agents. The main laboratory undergoes a continuous change of 160,000 cubic feet of air each minute.

One research building has five climatically controlled isolation rooms. Temperatures can be set from -30° F. to 110° F. With this range, any normal combination of temperature and humidity found in the United States can be duplicated for research.

Each isolation building is completely separate, with air-lock and dressing room-shower entrances. Walls, floors and ceilings are smooth concrete surfaces, easily decontaminated with live steam.

What's Being Done . . .

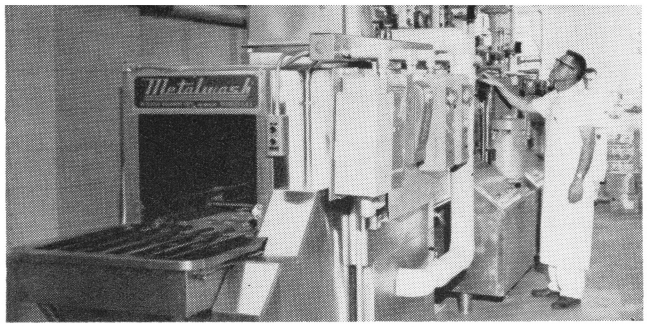
A list of diseases and disease organisms has been drawn up for study, incorporating the advice of livestock producers and of federal, state and local veterinarians and regulatory officials.

Included on the list are brucellosis, hog cholera and many others. Infectious and contagious diseases presently known to exist in the United States include 45 affecting cattle, 30 of swine and 25 of poultry. Mastitis of cattle, baby pig diseases and respiratory diseases of poultry are examples of other economically serious livestock health problems that are being tackled by the laboratory scientists.

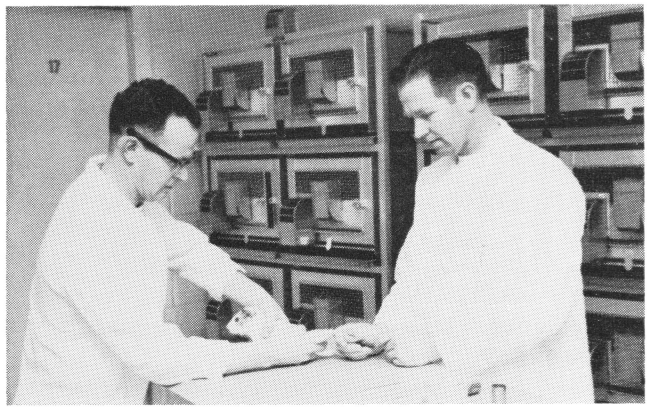
Enough test animals are used in experiments to assure scientists of sound research results. Some ex-

Meticulous care is taken to protect laboratory personnel and to prevent spread of diseases to the surrounding community. This large steam and gas wall autoclave is used to decontaminate all material leaving the research module. One door opens into the contaminated area to receive laboratory clothing, glassware and other re-usable supplies. Jim Rounds removes treated material from the other door that opens into the "clean" service corridor. Automatic controls prevent the opening of both doors at the same time.

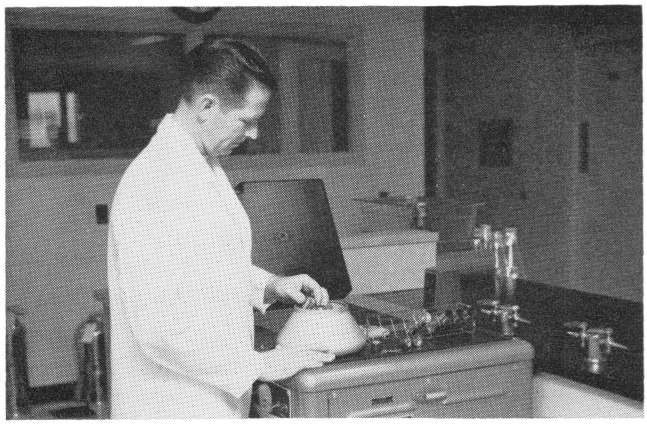
Even books and papers used in contaminated areas must be sterilized. This passclave (a small autoclave) is built into the wall between the records room of the laboratory unit and the outside corridor. James F. Sullivan, safety officer, removes books from the corridor side after overnight treatment. Materials that can't be treated with steam are treated with ethylene oxide, a gas that does not harm paper.



Glassware used in research passes through this dishwasher where it receives two detergent washes and three rinses. The glassware is chemically clean when it comes off the dishwasher belt.



This guinea pig is being inoculated in a small animal room. Jim Rounds holds the animal while Bacteriologist Joe Songer inoculates it. The main laboratory building has 32 separate units used for studies involving small animals.



Joe Songer loads cups of serum from a diseased animal into a rotor to be placed in a refrigerated centrifuge. Centrifuging is one step in the analysis of the particles in the serum.

ploratory work involves as few as 10 animals, but full-scale research takes many more. The laboratory scientists seek fundamental information about cause, transmission, diagnosis, prevention, treatment and control of diseases of livestock.

One of the scientists' big jobs is finding ways of combating diseases that are potential threats to the nation's livestock because of changed production and marketing conditions in the modern world.

Modern traffic in livestock and poultry creates difficulties. Producers today must cope with many diseases to which herds and flocks in the United States weren't exposed 75 years ago. Modern transportation and marketing mingle animals from different parts of the nation and increase chances of exposure. A steer today, for example, may live in three or four states before it is slaughtered. It took 15 years for hog cholera to spread throughout the United States after it was first diagnosed in 1833. Tick fever of cattle moved across North Carolina at a rate of 4 miles a year in the 1870's. But when vesicular exanthema of hogs broke out in California in 1952, it spread to 20 states in 3 months.

Regulatory Activities: About 20 percent of the center is used for regulatory activities. This work includes setting standards and testing veterinary biologics for safety and potency, and providing diagnostic services to support federal eradication and control programs.

Research personnel can test a wide variety of veterinary biologics before or after they have left the production plant. These products, which are used to prevent or control disease, are gathered from many sources—warehouses, farms and regular channels of trade. They are spot checked for safety, purity and potency at the new laboratory. Related studies seek to improve methods for standardizing veterinary biologics.

A pilot plant for the production of veterinary biologics is built into the regulatory area. As improved biological standards, tests and production methods are developed, they are given trial runs in the pilot plant. Findings that prove practical will be adapted for use in commercial laboratories.

The new federal laboratory doesn't duplicate or replace the services of state animal disease diagnostic laboratories or of the College of Veterinary Medicine at Iowa State. The federal laboratory will test or type unusual specimens for other laboratories and will provide consultation services to the states. It also will train federal disease eradication workers in diagnostic procedures.

A team of disease detectives, or epidemiologists, is being formed at the laboratory. These scientists serve the federal government in emergencies by tracing outbreaks of infectious animal diseases to the source herd or flock, and by identifying livestock exposed as the disease was spreading.

People Benefit, Too: The laboratory contributes to public health by developing improved ways to suppress or control animal diseases that also affect man. About 80 livestock diseases are transmissible to man, including tuberculosis, brucellosis, rabies, anthrax, Newcastle disease and others.

Discovery and understanding of animal diseases sometimes open the way for control of human diseases. The discovery that tick fever of cattle was caused by a protozoan parasite in the blood of infected animals, for example, led the way to an understanding and control of such human diseases as malaria, yellow fever, typhus, bubonic plague and Rocky Mountain spotted fever.

Animal disease research also can reduce the cost of meat, dairy and poultry products to consumers, aid in any expansion of livestock production to meet the needs of a growing population, and result in new or improved means of combating animal diseases transmissible to man.